

REMARKS

Claims 1-21 are in this application and are presented for consideration. By this Amendment, Applicant has amended claim 2 to address a minor detail. It is Applicant's position that no new issues have been presented by this Amendment.

Claims 1, 2, 4, 5, 6, 8, 14, 15, 17, 20 and 21 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Pampus et al. (GB 2012217) in view of Pratt (US 4,848,886).

The present invention relates to a snorkel device for a submarine. The submarine has a pressure hull. The snorkel device comprises a telescopically movable snorkel tube. The telescopically movable snorkel tube includes a telescopically movable structure connected to an outside of the pressure hull for extending and retracting an end of the movable snorkel tube. An optical observation means is connected to the snorkel tube. The optical observation means is provided for above-water observation during submarine travel at periscope depth. The optical observation means is formed as a compact unit that comprises an optronics unit and a short-travel drive. At least one further compact unit is provided. The further compact unit comprises at least one communications means and another short-travel drive. The optical observation means compact unit and communications means further compact unit are provided on the telescopically movable snorkel tube. The snorkel tube, which is mounted outside the pressure, is raised with the optical observation means compact unit and communications means connected to the snorkel tube. The optical observation means compact unit and communications means then extend relative to the snorkel tube via

respective travel drives. The prior art as a whole fails to suggest such features.

The present invention provides the advantage of a very compact and space-saving construction for a submarine snorkel device. The present invention allows the hindrance-free observation or only insignificantly hinders the observation of the sea region around the submarine, and additionally allows for radio communication. These advantages relate to the features of the optronics and the respective radio units being located directly on the snorkel tube in the present invention. With this the flow resistance is significantly lowered given an extended snorkel, which minimizes the reduction in the traveling speed of the submarine and advantageously saves in fuel for the combustion motor of the submarine. The lower flow resistance also advantageously provides a smaller signature (i.e. a white water tail of water foam and sea spray in the form of a bow wave are formed trailing on the surface of the sea from an extended apparatus), which provides the advantage of making the locatability of the submarine considerably more difficult. The present invention advantageously allows for the snorkel tube to first be raised, which also extends the attached optronics and radio antennae. Once the snorkel tube has been extended, the travel drives extend the optronics and radio antennae relative to the snorkel tube. This advantageously allows the travel drives for the optronics and radio antennae to be small and short since the optronics and radio antennae, because they are fastened to the snorkel, may firstly be displaced indirectly with the help of the travel drive of the snorkel.

A further advantage of the present invention lies in the fact that the operational readiness of the optronics and antennae may be reached considerably more quickly since

only short-travel paths need to be covered for extending these functional units. Due to the travel paths which are to be covered in a short and quick manner, the viewing impediment to the optronics caused by the antennae is minimized. Due to the compact construction of the snorkel device according to the invention, spacing in the tower of the submarine is optimized so that the tower can advantageously be used for other apparatus and/or for more persons in the tower. One advantageous design of the snorkel device according to the present invention lies in the fact that the individual compact units are assembled on the outside of the extendible and retractable snorkel tube of the snorkel so that the compact units and the snorkel tube carrying these compact units can be surrounded by a common streamlined casing. This advantageously reduces drag and provides better fuel economy for the submarine. The prior art as a whole fails to provide such advantages.

Pampus et al. relates to retractable masts for periscopes and optronic instruments on submarines. (page 1, lines 6-8). A container 1 is provided inside a submarine tower and is part of a pressure hull 10. The optronic mast is divided into two sections 3a and 3b which have different circumferences. Upper section 3a of the mast contains a window 12 for the transmission of infrared beams and a window 11 for the transmission of the visible part of the spectrum. When the submarine dives, mast 3a, 3b is withdrawn into container 1. Upper section 3a of the mast is guided along inner wall 8 of the container. Owing to the piston effect the water between section 3b and inner wall 8 is pressed out through jet 2. When the mast is fully withdrawn, lid 7 rests tightly on jointing 9 and makes the container completely watertight. Jet 2 is fitted with a non-return valve permitting water to be discharged but not

to enter.

Pampus et al. fails to teach or suggest a telescopically movable snorkel tube including a telescopically movable structure connected to an outside of a pressure hull as recited in claim 1. Pampus et al. also fails to teach a snorkel device mounted outside of a pressure space as recited in claim 20. Pampus et al. fails to teach a snorkel tube that extends with optical observation means and communication means that move relative to the snorkel tube via respective travel drives. Pampus et al. discloses a container which is part of the pressure hull and into which a mast is retracted completely when diving. Pampus et al. fails to mount the periscope to the outside of the pressure hull. At most, Pampus et al. teaches that the periscope passes through the pressure hull as it is raised. Pampus et al. suggests that the periscope is mounted in a pressure space and not outside of a pressure space. In fact, Pampus et al. is concerned with a completely different problem than the present invention. Pampus et al. solves the problem of protecting viewing windows of periscope and optronic masts against high water pressure at great depths. The present invention is concerned with a completely different problem than Pampus et al. The present invention relates to solving the problem of providing a compact and economical construction of a snorkel tube that permits communication with other marine participants while providing low locatability of the submarine. The present invention provides a different approach than Pampus et al. In the present invention, the snorkel tube is extended with the optical observation means and communication means connected to the snorkel tube. Once the snorkel tube has been extended, the travel drives move the optical observation means and communication means

relative to the snorkel tube. Pampus et al. fails to teach or suggest such features.

Pampus et al. is not concerned with the problem of providing low locatability of a submarine. Applicant fails to see how the periscope disclosed in Pampus et al. is the equivalent of the snorkel tube in the present invention. Applicant has discovered the problem that a submarine traveling with a raised periscope creates significant signature. The signature created by a periscope disadvantageously makes the submarine easy to locate. The snorkel tube of the present invention is telescopically extended and retracted, which also advantageously raises the optical observation means and communications means. The snorkel tube of the present invention advantageously has a bigger diameter than the periscope disclosed in Pampus et al. so that the optical observation means and communication means can be directly connected to the snorkel tube. In the present invention, mounting the optical observation means and communication means to the snorkel tube advantageously provides for a streamlined design. This significantly reduces signature. Mounting the optical observation means and communication means to the snorkel tube also advantageously allows travel drives to extend the optical observation means and the communications means relative to the snorkel tube once the snorkel tube has been extended. The travel drives are advantageously short because the snorkel tube first indirectly displaces the optical observation means and communications means. Pampus et al. fails to disclose or suggest anything about using travel drives to raise the periscope. At most, Pampus et al. discloses a container 1 for protecting the windows 11, 12 of a periscope under great pressure when the periscope is retracted into the pressure hull. As such, the prior art teaches a different

approach and fails to suggest the features or advantages of the present invention.

Pratt fails to provide any teaching or suggestion which would lead the person of ordinary skill in the art toward the combination claimed. Pratt discloses a periscope system including an optical means arranged in the tower of a submarine. However, the references together provide no basis which would lead or direct the person of ordinary skill in the art toward the combination as claimed. Pratt fails to disclose a snorkel device. Applicant finds neither a teaching nor a suggestion of a snorkel device for a submarine in Pratt that includes movable optical observation means and a communication means. At most, Pratt discloses a mast head 7 that is telescopically extendable by a hoist device 13. The present invention takes a different approach. In the present invention, the snorkel device is telescopically extended. The optical observation means and communication means are extended via respective travel drives. This advantageously lowers signature and makes it more difficult to locate the submarine. With the optronics and the respective radio units located directly on the snorkel tube in the present invention, the flow resistance is significantly lowered given an extended snorkel, which minimizes the reduction in the traveling speed of the submarine and advantageously saves in fuel for the combustion motor of the submarine. The periscope disclosed in Pratt disadvantageously creates significant signature and makes it easier to locate the submarine while disadvantageously increasing flow resistance. The references provide no direction or using teachings of Pratt to modify Pampus et al. Pratt clearly fails to teach and clearly fails to suggest the combination claimed in claims 1 and 20. Accordingly, Applicant respectfully requests that the Examiner favorably reconsider claims

1 and 20 and all claims that respectively depend thereon.

Claims 3, 7, 9-13, 16 and 18-19 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Pampus et al. in view of Pratt, and further in view of Wöntig et al. (DE 3637618 A1). Although Wöntig et al. teaches an extendable antenna mast consisting of a profiled mast attached to the body of a submarine, the references as a whole fail to suggest the combination of features claimed. Specifically, Pampus et al. fails to teach or suggest a snorkel device mounted to an outside of a pressure hull of a submarine. Absent a teaching or suggestion of the important feature of the invention, the combined references clearly do not direct the person of ordinary skill in the art toward the combination as claimed. The references do not suggest the invention and therefore all claims define over the prior art as a whole. Accordingly, Applicant respectfully requests that Examiner favorably consider claims 3, 7, 9-13, 16, and 18-19 as they are based on claim 1.

Claim 14 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Pampus et al. in view of Pratt, and further in view of Woodland (US 6,269,763). Although Woodland teaches a rigid mast that is extended or retracted into position by a hydraulic lift cylinder, the references as a whole fail to suggest the combination of features claimed. Specifically, Woodland fails to teach or suggest the combination of a snorkel device having a telescopically movable snorkel tube. The references do not suggest the invention and therefore all claims define over the prior art as a whole. Accordingly, Applicant respectfully requests that the Examiner favorably consider claim 14 as it is based on claim 1.

The prior art as a whole fails to direct the person of ordinary skill in the art toward the

feature of the invention. Further, the invention includes cooperating features which provide particular advantages which are neither taught nor suggested by the prior art. Accordingly, Applicant requests that the Examiner favorably reconsider the claims in light of the discussion above.

Further and favorable consideration on the merits is requested.

Respectfully submitted
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